

MISSOURI

resources

Spring / Summer 2008 • Volume 25 • Number 2



Director's Comment



DNR photo by Scott Myers

From front left, John Beard, Greg Robertson, Joe Engeln, Curt Gately, Betty Finders, Doyle Childers, Debbie Boeckman, Mary Williams, Amber Kreter, Carol Finke. Back left, DL Ragar, Richard Laux, Don Boos, Alice Geller, David Green, Kirk Mitchell, Darleen Groner, Ken Koon.

As I write this, it's a beautiful day in March. The sun is shining, and the temperature has topped 70 degrees. Spring truly is here. And, as I always do this time of year, I encourage you to get out and play in one of Missouri's 84 state parks and historic sites. We have added a new state park along the Current River in Shannon County on the site of the historic former Alton Club/Presley Conservation Education Center. Plans for the park are currently under development.

I realize that not everyone who contacts us is looking for a place to camp or recreate. Recently, the Department of Natural Resources expanded its online community assistance. Finding answers to environmental questions or concerns is now easier, thanks to our new community assistance Web portal.

This Web page consolidates links to information to help citizens, community leaders and business owners find environmental assistance. With just one click, users can get information about grants and loans, find out more about the permitting process and access environmental tools and resources. It's also a great source for learning more about Missouri's environmental regulations. You can also access the department's calendar of meetings and events and sign up to receive e-mail updates from the department.

This Web site is an important time-saver for the communities, businesses

and citizens that we serve. All these important changes take place because of dedicated staff at the Department of Natural Resources.

Recently, they were honored by the Environmental Council of the States. ECOS is a national, non-profit, non-partisan association of state and territorial environmental agency leaders. The group pictured above received ECOS' Best State Innovation Award for their efforts in creating another new online tool – Permit Assistant. Please visit this issue's News Briefs section for more on these new improvements.

Improvements in the implementation of new federal water quality standards in Missouri were also recognized by ECOS. Along with Iowa, Kansas, Nebraska and the EPA, Missouri was honored for getting these new standards on the fast track and ensuring cleaner water for the region.

It was nice to visit with many of you at Bennett Spring opening day of trout season. This summer, I hope to see many more of you in our state parks or meet with you at our continuing series of town hall meetings. I hope you had an enjoyable Earth Day and have a fun and safe summer!

Doyle Childers
Missouri Department of Natural Resources

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Mission Statement

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Testing the Waters



DNR photos by Scott Myers

Above right: Curious boys search a streambed for nature's wonders in one of Missouri's state parks.

Above: A summer storm rolls in over the Mississippi River near New Madrid.

FRONT COVER: Big Oak Tree State Park near East Prairie is home to some of the largest trees in Missouri.

BACK COVER: Fluctuating river levels create strange patterns in the sandy mud along the Missouri River near Huntsdale.

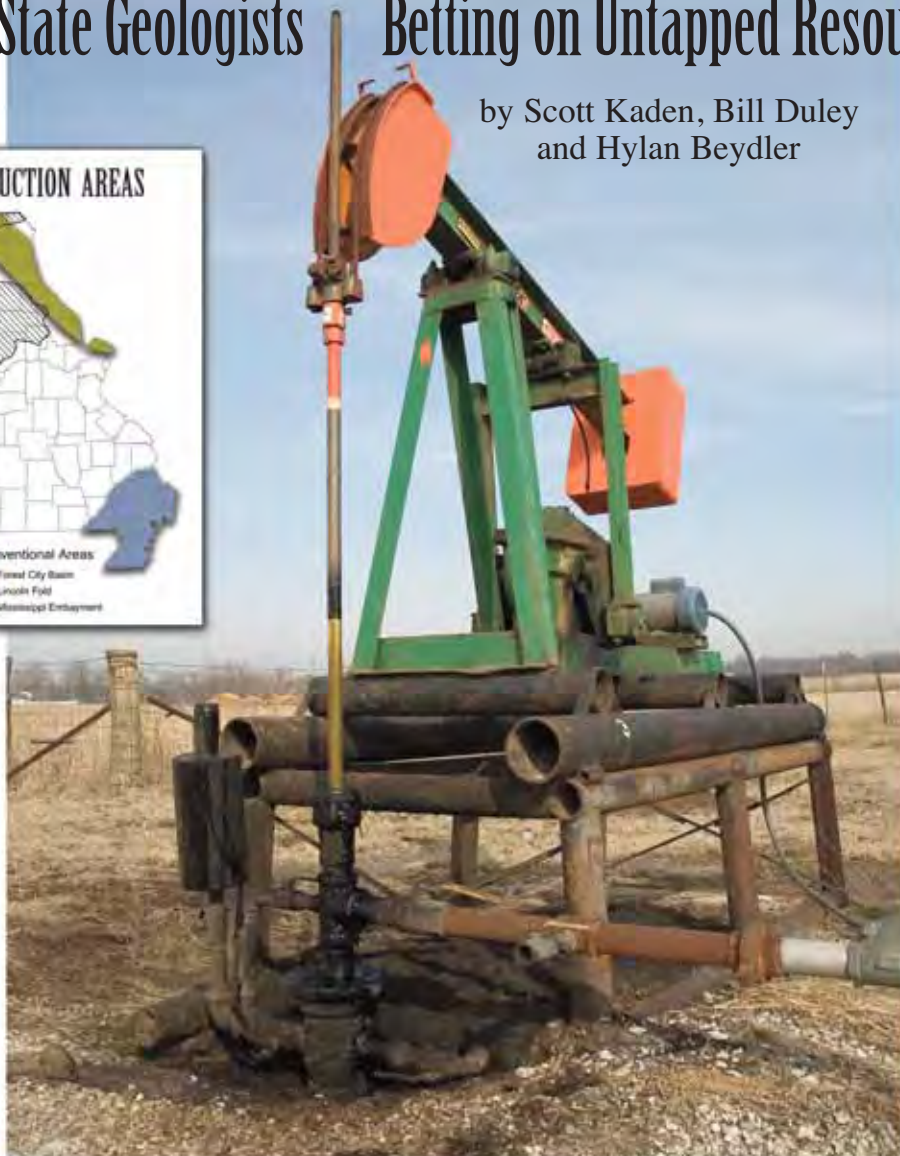
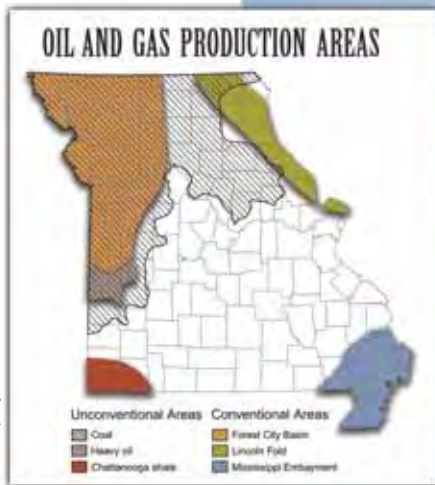
Cover photos by Scott Myers.

MISSOURI'S BLACK GOLD

Show-Me State Geologists Betting on Untapped Resources

by Scott Kaden, Bill Duley
and Hylan Beydler

DNR map by Elisha Bonnot



DNR photo by Scott Myers

Oil and gas in Missouri? You bet, and others are betting on it, too. Considering the uncertainty associated with foreign supplies and with the price of oil reaching record highs, there is renewed interest in producing oil in the Show-Me State. While \$4.8 million or nearly 80,000 barrels of oil were produced in Missouri in 2007, the value of untapped oil and gas resources is estimated to be in the hundreds of billions of dollars.

Anyone interested in drilling for oil or gas in Missouri must apply to the department for a permit and secure a bond. This

bonding process helps ensure the protection of our environment. Owners who abandon or improperly plug wells jeopardize groundwater supplies and consequently, forfeit their bond, which may then be used to properly plug the well.

How and Where Oil and Gas Deposits Accumulate

For oil and gas to accumulate in economically recoverable quantities, three naturally occurring conditions must exist: 1) A significant source of hydrocarbons (decayed or-

(Above) This electric pumpjack is moving oil to the surface from a well in Cass County.

(Inset) This map defines the locations of Missouri oil and gas resources.

ganic material); 2) a porous host rock to store the petroleum, and; 3) a low-permeability cap rock immediately above the oil or gas-bearing zone that will trap the hydrocarbons. Normally, the best place for oil and gas to accumulate is where the bedrock layers are bent and contorted into folds. Upward, folded rock layers conducive to hydrocarbon accumulation are called domes or anticlines.

Production Techniques

Nearly all of the state's oil and gas production has been using standard well-pumping techniques. These wells produce by pumping liquid oil from a simple drill hole. Conventional gas or methane production occurs when the gas is allowed to escape from its reservoir to the surface where it is captured for use. More complicated procedures are needed to enhance oil and gas production in some types of deposits. Unconventional production techniques such as injection of heated gases may be used to thin oil; or carbon dioxide may be pumped into a coal seam to enhance production of methane gas.

Conventional Production

Last year, developers produced oil from 306 Missouri wells. Sixty additional wells were recently permitted. While there is no commercial gas production in Missouri, five new commercial gas permits were recently issued. There also are about 50 domestic gas wells being used by private homes and small businesses for heat.

There are two areas with documented petroleum reserves for conventional oil and gas production in Missouri. One is the Forest City Basin, located in northwest Missouri and adjacent portions of Iowa, Nebraska and Kansas. Production here has come from sandstones and fractured limestone. Natural gas also has been produced here from sandstone and black shale bedrock units.

The second area where oil is being produced is associated with the Lincoln fold. The fold extends from northern St. Louis County northwest to Knox County. This area has seen continuous oil production since 1952.

An area in extreme southeastern Missouri, known as the Mississippi Embayment, is experiencing renewed exploration interest. The potential is greatest where the geologic structure called the Pascola Arch

lies deeply beneath Pemiscot and Dunklin counties. No production and only limited exploration has occurred in this area. This is due, in part, to the depth of the potential oil reservoir.

Unconventional Production

Three potential sources of hydrocarbons in Missouri that will need to implement unconventional production technology include tar sands, coalbed methane and oil shales.

Tar sand is thick, heavy, molasses-like black oil – a combination of clay, sand, water and tar. Special techniques are required to thin the oil for extraction. Most of Missouri's tar sand deposits are located in western Missouri, near the Kansas border.

Nearly 800,000 barrels of oil have been produced since 1960 in Vernon County, with a record annual high of more than 163,000 barrels in 1984. Recent estimates



DNR photo by Mark Gordon

of reserves in this region are 1.4 billion to 1.9 billion barrels of oil.

Many do not realize that Canada is the United States' largest supplier of oil, exporting more than 886 million barrels in 2007. Annually, Canada produces about 255 million barrels of oil from tar sands.

MegaWest Energy Corp., a Canadian company, drilled 40 new oil wells in Vernon County in 2007 and hopes to complete another 100 by year's end.

Paul Krawchuk, MegaWest's production engineering manager said, "The interest in

(Above) Scott Kaden, right, and members of the Kansas Geological Survey examine newly extracted core samples. Geologists will analyze these rock cores to determine the potential for coalbed methane production in Cass County.



DNR photo by Mark Gordon

(Above) This boiler is used to produce steam that is injected underground to help move heavy oil to the surface in Vernon County.

(Below) A drilling crew from the Kansas Geological Survey draws rock core samples from hundreds of feet below the land surface.

energy feels that recovery techniques [used] in the Canadian oil sands can be applied to these largely forgotten resources,” Krawchuk said.

Krawchuk also believes the heavy oil deposits in Vernon County are a prime example of forgotten energy resources. “This heavy oil resource is an excellent candidate for enhanced recovery and ... MegaWest’s team ... can help us achieve significantly

developing Canada’s oil sands deposits was sparked in the early 1960s. When the projects were brought on-line they didn’t make any money, but the technology has been improved over the years to the point where economic recovery of these resources is possible.”

According to Krawchuk, most major oil companies are chasing the massive reserves in the Canadian oil sands. For the most part, they have overlooked some large deposits of heavy oil that are in the continental U.S.

“MegaWest En-

higher recovery factors than possible 20 years ago.”

Coalbed methane is a gas that is produced as coal ages and is altered by naturally occurring bacteria. During this aging process, methane is produced and attaches to the coal. To produce methane, a hole is drilled into the coal bed and the groundwater pumped out. Once the coal is de-watered, the methane is released from the coal.

“We are working in conjunction with the Kansas Geological Survey to determine the feasibility of producing this methane gas in Cass and Bates counties,” said Joe Gillman, director of the department’s Geological Survey Program.

“Core holes were drilled last fall to better evaluate the porosity of the rock units and quantify the potential reserves,” Gillman added.

He sees the preliminary results of that study as promising, and anticipates the state’s first commercial production of coalbed methane should occur in 2008.

Another unconventional source of petroleum reserves is oil shale, a finely layered, brown or black shale. When processed, oil shale yields hydrocarbons. Chattanooga Shale is an oil shale lying in extreme southwestern Missouri. The department recently received a permit application to drill a well in McDonald County in an attempt to produce natural gas from this oil shale unit using experimental technology.

Recent Advances Hold the Key

Energy costs have been increasing and production of conventional oil and gas resources in Missouri will likely continue to grow. Recent advances within the industry that can make it cheaper to recover unconventional oil and gas reserves may make Missouri a more significant producing state.

Estimates of the economic value of Missouri’s undeveloped coalbed methane could be in the billions of dollars. Oil shale production could ramp up if the experimental technological advances make it profitable. Tar sand is once again being produced in Vernon County. In time, these unconventional resources could become Missouri’s “black gold.” 🌅

Scott Kaden is a geologist for the Division of Geology and Land Survey in the geologic resources section. Bill Duley is DGLS’s deputy director and Hylan Beydler is the information officer for the division.



DNR photo by Mark Gordon

SUCCESS AT TWO MILE PORK

by Philip J. Tremblay
photographs by Scott Myers



Clean Water Law

Missouri's Clean Water Law clearly defines the department's mission to protect and preserve the waters of the state. We make every effort to balance the desires of the public while being responsive to the needs of the regulated community. However, the statutory authority given to the Missouri Department of Natural Resources by the legislature only allows us to ensure the permit application complies with Missouri Clean Water Law and that the operation will protect water quality.

When making a decision on the permit application for a facility, the department reviews all public comments received before issuing the permit.

It does not have jurisdiction to address questions of zoning, location, property values, tourism or other items not related to water quality. If the permit application meets all regulatory requirements and demonstrates that the operation will protect water quality, the department is obligated by law to issue the permit.

Concentrated animal feeding operations' problems are often the result of inadequate planning and poor site selection. Rarely heard about, and even less often seen, are those whose farms have long-term, documented success in establishing and maintaining their operation. Two Mile Pork, a medium-sized CAFO near Monroe City, is just such a place. Employing best management practices for five generations, the operation has grown, right alongside the environmental laws that are an everyday reality for today's CAFO. With more stringent water quality rules and manure management regulations only months away, CAFO operators will need to step up their operations, or fall out of compliance.

Often, behind the myriad newspaper headlines and media reports critical of concentrated animal feeding operations – CAFOs – are stories that look beyond the factory farms owned by out-of-state corporations. There is a history of local family

farms that have successfully matured, alongside America's demand for economical food production.

CAFOs focus environmental pressures on water, air and land resources. This requires that the Missouri Department of Natural Resources be in-

volved from the very start in an environmental oversight role.

Scott Hays is a fifth-generation pork producer from the Monroe City area who is reaching out to help explain what it means to raise hogs today. As a key player in the family-

owned Two Mile Pork Farm and a leader in the Missouri Pork Association, he has sought to represent the pork industry in a positive way.

As he told an audience at last summer's Missouri State Fair: "I've been truly blessed to have the opportunity to do what I enjoy doing for a living and to raise my family on this farm for the past 18 years. Pork production, like many businesses, has changed over the years. Like all businesses, we start each day with two choices – to go into survival mode and allow economics to decide if our business is viable or not, or to take what we have and grow it to a size that will sustain us for the next generation."

Hays grew up on a farm that his great-grandfather Benjamin had purchased. He has seen pig production move from outdoor dirt lots, to outdoor concrete lots to today's indoor facilities. At first, Benjamin

plowed the hilltops and flat acres on the farm, planted grass and raised cattle on the lands too steep for row crops. He fenced his hog lots along the steep banks of Sandy Creek. Farmers knew that healthy pigs needed a clean place to live, and rainwater and the creek kept his lots clean.

"Every farmer raising pigs along Sandy Creek used the same advantages of steep slopes and trees," Hays recalled. "By the 1970s, when my brothers and I would play along this creek, there were no fish and the creek would become stagnant without enough summer rain." Today, the sixth generation of Hays children enjoy camping and fishing along that same creek.

"I've been fortunate to have been raised around people who have been progressive and known that we have to protect the environment – our natural resources," he said. "My great-grandfather terraced this farm in the

1930s with a team of horses and a dirt drag. In the late 1970s, my dad and uncles replaced those with modern tile-outlet terraces."

It was about that time that the family began putting their pigs on concrete lots and attempted to contain manure – as a resource that could boost crop production rather than something to get rid of. Hays said that concrete lots still exposed pigs to weather and manure so as new practices came from Europe to the United States, pigs were moved indoors.

Two Mile Pork is now protecting the pigs from the elements, controlling the temperature and humidity for them and removing manure and urine immediately from the area where the pigs live and placing it in storage facilities. As a CAFO, they must follow state and federal rules designed to protect the environment. "From the beginning, ag engineers and the DNR have been involved," said Hays.

Hays recently asked his dad what he recalls from those earlier days. He replied, "Looking back, we didn't always do things as well as they could have been done, but we did the best that we knew how to do at the time." Today the younger Hays says, "I hope that when I'm retired from this industry, I also can look back and honestly say we did the best that we knew how to do."

Concentrated animal feeding operations are agricultural facilities that house and feed a large number of animals – more than 2,500 pigs over 55 pounds and more than 15,000 pigs less than 55 pounds – in a confined space for a limited period of time. Since April 2003, the federal government requires all CAFOs to obtain a National Pollutant Discharge Elimination System permit and to develop a plan for proper management of animal wastes on the site. The operation must also report those practices to the Department of Natural Resources each year to remain in compliance.

There are approximately 450 CAFOs with cattle, hogs, chickens or turkeys operating in Missouri. These operations generate a large amount of manure and have the potential to seriously impact water resources. Mis-

CAFO Issues in Missouri

- Fugitive odors can affect nearby property owners.
- If not managed according to requirements, manure applications from operational waste can cause runoff pollution and nutrient loading in nearby streams and can reach underground water sources.
- Three operations are in various stages of completion and sited near the state parks or historic sites listed below.

Roaring River State Park

- The Eagle Rock concentrated animal feeding operation is downstream of the park. In fact, any potential contaminant release or runoff from land application of wastes would occur outside the recharge area of the spring. Currently, the operator hauls his litter offsite for pasture applications for customers who pay for this service. This site's operating permit currently is under appeal.

Arrow Rock State Historic Site

- This hog farm is not yet constructed. Completed, it would be located two miles from the Arrow Rock city limits and two and one-half miles from the historic site. If the proposed permittee follows the permit requirements and follows best management practices, the facility will be protective of water quality. This site's construction permit currently is under appeal.

Battle of Athens State Historic Site

- The manure application method used near this historic site uses knifing, which mechanically injects the waste into the soil. The waste application process for this facility only takes one to two-and-one-half days per year, minimizing the potential chance for fugitive odors to affect site visitors.

The Missouri Department of Natural Resources believes that by following prescribed best management practices and operating within environmental laws, these operations will be both productive, successful and protective of the natural resources of Missouri.

souri's rules and regulations are designed to minimize the risks CAFOs pose to water quality and public safety. Water quality is protected through the department's permit application and approval process.

As authorized by the Clean Water Act, the federal NPDES permit program controls water pollution by regulating point sources that discharge various pollutants into waters of the United States.

The NPDES process requires the department's Water Pollution Control Branch to issue permits to build, erect, alter, replace, operate, use or maintain existing point sources of water pollution. Most of these permits are for the discharge of treated wastewater from domestic and industrial facilities. Permits also are issued for land application of wastes from domestic, industrial and agricultural facilities. Permits usually specify requirements for regular sampling of wastewater at the discharge points. In the case of land application, the permit also specifies approved methods by which wastes are handled and disposed.

In 1989, Hays and his wife, Riss, purchased half of her grandfather Don Abell's farm and joined into partnership with her parents, Larry and Dorothy Abell. In 1994, Larry and Scott joined with Pat, Nick and Tony Hays of the Hays Brothers Farm. Together they started Two Mile Pork – a farrow-to-finish operation.

"We farrow the sows at one site and pigs are moved to other buildings to be grown and finished," said Hays. "Two Mile Pork is a 4,000-sow farrow-to-finish operation that produces 1,900 pigs per week."

Since 1994, the farm has incorporated automation that uses a comput-



(Above) Co-owner, Scott Hays, inspects newly weaned pigs in the load-out area. Two Mile Pork produces 1,900 pigs per week.

erized system to feed pigs as much as four times per day. The operation uses robotics to move breeding boars safely within the units and move the carcasses of pigs normally lost during production to a stainless steel composter that turns the dead animals into valuable fertilizer. An evaporative cooling system cools the pigs to boost production and makes working conditions more comfortable for the farm's 19 employees.

To meet new CAFO permit requirements, the farm must maintain a plan that records the proper application of manure to crop lands according to yields. Two Mile Pork controls odors with a combination of deep pit manure storage and, during land application, wastes are knifed into the soil to

capture the most nutrient value for crops.

Each year, Two Mile Pork uses 900,000 bushels of corn and 200,000 bushels of soybeans for a feed expense of more than \$6 million. Their supply and shipping puts three tractor trailers on the road each day at a cost of \$284,000 per year. Total operational costs are more than \$10 million – most of it spent within Monroe and Marion counties. According to U.S. Department of Agriculture formulas, this volume of business provides an \$18.2 million per year economic impact on local communities. Jobs created on the farm and related support businesses generate more than \$4 million per year.

"Future technology will truly change the landscape of the pork production business and will require a certain size operation to justify the adoption of these new technologies," said Hays.

The farm is currently studying, with a St. Louis firm, the feasibility of

making plastics and wood substitutes out of hog manure. They also are closely monitoring a pilot project at a St. Charles farm where manure may be turned into crude oil.

"As our family has demonstrated through the generations, we are very conscious of the daily responsibility we have to our neighbors and fellow business persons who rely on the tourists who visit our area," said Hays. "It is important to the owners and employees of Two Mile Pork to be good stewards of the land and be a positive part of the community and state in which we live." 🌻

Philip J. Tremblay is a public information coordinator and assistant editor of Missouri Resources.

Get Out and Play!



DNR photo by Scott Myers



by Jennifer Sieg

Back in the days before computers, video games and endless television channels, most kids spent their spare time playing outside. When the weather got warm, the door flew open and they rushed out like the wind, only to return when the dinner bell rang or it got too dark to play. Imaginations soared from make-believe “club houses” hidden in a small grove of trees. Encounters with the natural world’s inhabitants, plant or animal, were inserted in the script of the daily adventure. Today, the sights, sounds and smells encountered on just a short stroll through the woods can trigger memories of those care-free days for the now-adults who experienced them.

Since those days, technology has come a long way and brings with it a troubling trend in entertainment for children. With the ongoing increase in forms of entertainment that require an electrical outlet, most young people are not experiencing the same kind of childhood their parents had. Joysticks have replaced baseball bats, portable music players have blocked out sounds of singing birds, and fingers have become the most exercised part of the body. Kids are exploring make-believe lands from a chair and are relatively unaware of the natural wonders that lie just beyond their front door.

(Above) Nine hundred miles of trail are waiting in Missouri state parks for adventure seekers. (Right) Youngsters learn to identify a tree by its leaves at one of the many nature programs held each summer at most state parks.



Photo by George Denniston

The Missouri Department of Natural Resources' Division of State Parks challenges parents to change these trends. Through an initiative called Get Out and Play!, families and children are being encouraged to get out of the house and freely explore everything that the outdoors has to offer. This will bring the opportunity to connect with nature – smell the fresh air, hear the birds and insects, see the vibrant colors of wildflowers and feel the warm breezes or refreshing chill of fall air. In the near future, this generation of technology-savvy youth will be responsible for preserving and protecting Missouri's natural resources and their interest needs to be piqued now. So, now is the time to Get Out and Play!

State parks and historic sites have always been great places to do this as they offer free access to the great outdoors. The following activities and programs will enhance your visit.

Go hiking! What better way is there to explore the outdoors? Missouri state parks and historic sites offer more than 900 miles of trails, ranging from an easy stroll to a rugged mountain hike.



Photo by George Denniston

Just relax – leave the schedule at home! Sit at a picnic table and watch your kids' creativity and curiosity flourish as they explore nature at their own pace. The whole family will probably find nature to be quite calming.

Many state parks offer nature programs throughout the summer months. Go on a spider sniff or butterfly hunt, check out aquatic life during a river wade, learn about wild edibles or snakes, or view and learn about the

(Above) Water recreation is available at many state parks, such as Pomme de Terre in Hickory County.

(Below) A family looks for aquatic life in a stream at Graham Cave State Park in Montgomery County.

Simple Outdoor Activities

Hey kids! Here are some fun suggestions on how you can enjoy your next outdoor adventure!

While you slowly explore one of the many trails offered in state parks and historic sites:

- 🔍 Listen to the birds and bugs and try to find where the noise is coming from.
- 🔍 Count how many colors you see or how many different insects or animals that you encounter.
- 🔍 Create an A to Z page. List one thing from your visit for each letter of the alphabet.
- 🔍 Make a journal. Record your visit by taking photos and pasting them in a notebook or sketching your favorite parts of your visit. Add captions and share your journal with family and friends.



Photo by George Denniston



Become a Missouri State Parks and Historic Sites Explorer



New in 2008! Anyone at any age can earn an Explorer patch by completing the following projects at one or more state parks and historic sites. This is a great way to learn more about nature and Missouri's past. For more information, visit [www.mostateparks.com/explorer.htm], or ask park or historic site staff how you can get started.

1. Complete two service projects like picking up trash, helping with an interpretive program, etc.
2. Do two of the five activities listed below with park or historic site staff.
 - Draw a map of the park or historic site for an important time period in the past, how it looks today, or how it may look in the future.
 - Tell about a plant or animal important to the park. Make a poster of your plant or animal out of natural material.
 - Tell about a building, artifact or past resident of the historic site. Make a poster of it.
 - Learn about a period craft and explain its significance or build something using a reproduction of historical or ancient tools.
 - Tell about a special feature found at the park or historic site.
3. Attend at least three interpretive programs led by park/historic site staff. These can include guided tours, hikes or evening programs.
4. Identify 10 important things at a park or historic site. Consider a wide range of subjects – plants, animals, rocks, fossils, minerals, historic events or people.

A young state park visitor displays a bird feeder that was constructed during an Explorer program – a step toward earning a state park Explorer patch.

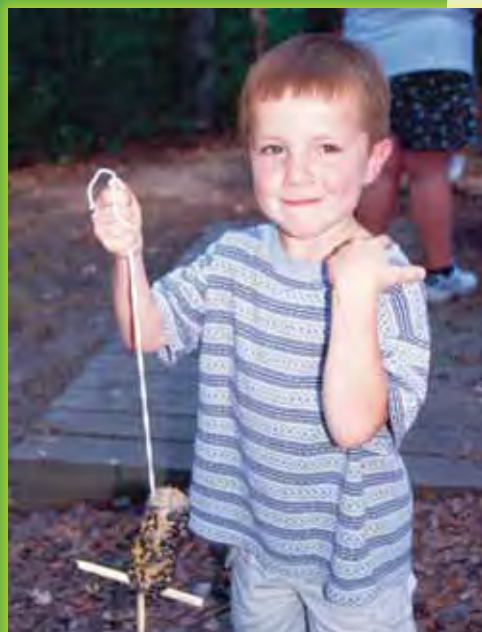


Photo by George Denniston

night sky. Call a particular park or check out the park's bulletin board for a schedule.

Watch for special events

Ride the entire length of Katy Trail State Park on the annual Katy Trail Ride (see Resources to Explore, pg. 20), go on a guided hike to see and learn about wildflowers or take a wild cave tour. To learn new skills or enhance your current outdoor skills, attend one of the WOW Outdoor Recreation and Conservation Schools held at various locations throughout the state. For a complete listing of special events in state parks, visit the online calendar at [www.mostateparks.com/events/events.htm].

Get wet! Many state parks and historic sites border or encompass lakes, streams or rivers for fishing, swimming, canoeing, boating or just observing.

Sleep under the stars! Thirty-nine state parks offer campgrounds and the opportunity to hear nature at night.

Children don't have to participate in structured or educational activities to enjoy and appreciate nature. In just a few minutes of free time outside, they'll appreciate the shade provided by a tree, be fascinated with the bugs busily crawling around and enjoy the sense of freedom being outdoors can provide.

State parks and historic sites are invaluable resources to discover, treasure and share as a family. Help protect these resources for future generations by showing today's kids what is so great about the great outdoors. Exposing children to nature and history will plant seeds of curiosity; then just sit and watch them grow.

Watch for more Get Out and Play! special programs and incentives in 2008 and 2009 that are geared towards getting families outdoors.

For more information on the many outdoor opportunities that Missouri state parks and historic sites have to offer, contact the Division of State Parks at 1-800-334-6946 (voice) or 1-800-379-2419 (Telecommunications Device for the Deaf) or go online at www.mostateparks.com. ☀

Jennifer Sieg is a public information specialist with the Department of Natural Resources' Division of State Parks.

A Facelift for Rocky Fork

by Richard O'Dell
DNR file photographs

From the late 1950s until 1972, the Peabody Coal Co. mined approximately 3,500 acres of coal from one of their mines in Boone County, about seven miles north of Columbia. Most of the mining occurred during a time when there were no rules requiring the company to protect the environment or reclaim the land. As a result, much of the area was left with large areas of rugged ground that made it difficult to cross on foot and impossible to cross in a vehicle. Several of the ponds left on the site had acid water that would not support fish and aquatic populations. Much of the surface and subsurface soils were acidic, highly erodible and were washing sediment into the adjacent stream system. This acidic runoff caused periodic fish kills.

Then, in 1971 the first mining legislation passed in Missouri which required Peabody to do some reclamation on a few acres at the mine site before they ceased operations.

The State of Missouri purchased much of the mine area in the 1970s. It then became Rocky Fork Lakes Conservation Area, managed by the Missouri Department of Conservation, and Finger Lakes State Park, managed by the Missouri Department of Natural Resources' Division of State Parks. These areas cover 2,025 acres and 1,128 acres, respectively.

The abandoned mine land unit of the Department of Natural Resources, Land Reclamation Program, recently completed a reclamation project on some of the worst portions of the abandoned mine site, primarily on 41 acres of the Rocky Fork Lakes Conservation Area. The Land Reclamation Program worked closely with the department's Division of State Parks and



(Above) A sign informs the public that the department's abandoned mine land unit uses federal funds to help reclaim these properties throughout the state.

(Left) A contractor applies slurried lime to neutralize an acidic pond.

the Missouri Department of Conservation to ensure that the project met the needs of all involved.

"The reclamation project at Rocky Fork Lakes Conservation Area is an outstanding example of the teamwork that exists between our two agencies," said Tim James, a Conservation Department wildlife biologist.



BEFORE

(Above inset and right)
Large areas of acidic soil were scattered throughout Rocky Fork Lakes Conservation Area, and were unable to support plant life. They offered poor habitat for wildlife and the acidic soil was highly erodible.

The project's goals were to stabilize large and dangerous erosion areas and reestablish a better stand of vegetation in order to control future erosion problems. It also was important to stabilize two acidic ponds and prevent additional acidic sediment from entering Rocky Fork Creek.

The reclamation project consisted of grading approximately 80,000 cubic yards of acidic coal-mined waste to a gentle slope. The work required scrapers, track hoes, dump trucks and bulldozers.

Throughout the grading process, the acid soils were treated with about 7,000 tons of agricultural lime obtained from local limestone quarries. Approximately 120,000 cubic yards of non-toxic cover material from other locations at the site were spread over the area to cover the acidic subsoils to promote successful revegetation. Nearly 4,700 tons of rock were used for erosion control and the resurfacing of access roads.

Finally, the 41 acres of disturbed land were seeded with a temporary green manure crop of cereal rye to stabilize the site and prevent erosion, as well as help rebuild the soils. This soil building will help ensure the

success of the permanent vegetation which will be planted later.

Two additional temporary seedings are planned for the area; one using pearl millet in the summer of 2008 and one using annual ryegrass in the fall of 2008. These temporary seedings will then be followed up by a permanent seeding with warm-season grasses in the spring of 2009. The reclamation of the Rocky Fork area also included treating two acidic ponds with alkaline and organic materials. This treatment is intended to change the water chemistry in hopes of transforming those water bodies into healthy ones.

The department began working on the project in March 2007. Now that the project is largely completed, it will be very difficult for most people to imagine that the area was once a coal mine. Once the vegetation is fully established, the area should look like any other gently sloped pasture area.

The contract for this project was awarded to C. L. Richardson Construction from Ashland for \$913,086.45. The total cost for the project was \$933,823.61. The project was



AFTER



entirely funded with federal grant money as part of the Abandoned Coal Mine Reclamation Fund. The money in this fund comes from a fee collected by the federal government on every ton of coal produced by active coal mines throughout the U.S. This money is then redistributed to states with abandoned coal mines so the states can reclaim the abandoned mine areas.

Missouri is a minimum base state and currently receives approximately \$1.5 million per year from this fund. This is the minimum distribution amount and is based on an inventory system of the abandoned coal mines in the state. Recent changes to the abandoned mine land fund will soon change the amount of money each state will receive. Under this new structure Missouri's funding will double to about \$3 million per year within the next four years.

The five-person abandoned mine land unit in the department's Land Reclamation Program uses the grant money to reclaim sites throughout the state based on a priority ranking system. The sites that pose the greatest dangers are reclaimed first. Since the money used by the abandoned mine land

unit to repair these problems comes from fees on coal mining, it is primarily spent to address the issues related to abandoned coal mines. However, the money is also available for reclaiming some abandoned non-coal mine problems such as lead and zinc mine shafts. In order for the money to be used in these instances, there must be a serious health and safety hazard present. The governor is then required to officially request that the shafts be closed using the federal funds.

Since 1980, approximately 60 non-coal shafts have been closed and 70 abandoned coal mines have been reclaimed by the Land Reclamation Program using these federal funds. However, there are still more than 100 abandoned mine sites remaining throughout Missouri that need to be reclaimed.

The Rocky Fork reclamation project is just one example of the many successes attained by the department to reclaim mined land in the state. The improvement in water quality is just one benefit realized from the project.

According to Conservation's Tim James, the Rocky Fork reclamation "has restored wildlife habitat and ecological function to the land and local streams for the benefit of Missourians."

For more on reclaimed sites in Missouri, visit [www.dnr.mo.gov/env/lrp/], or call the department toll-free at 1-800-361-4827. 🌞



(Top and above) The barren and eroded landscape has now been reclaimed and reseeded with warm-season grasses. The improved soil base and cover will retain moisture, minimize runoff and provide improved cover for various animal species.

Richard O'Dell is an environmental specialist in the department's Land Reclamation Program.

Eastern Thought Process Protects Midwestern Water Resources



DNR photo by Scott Myers

The department's Kaizen process team, left to right: Alice Geller, Phil Schroeder, Dan Schuette, Doyle Childers, John Ford and Jim Macy.

The Environmental Council of the States recently recognized Missouri, Iowa, Kansas, Nebraska and the U.S. Environmental Protection Agency with an award for their innovative work to improve the water quality standards development process. ECOS is a national, non-profit, non-partisan association of environmental agency leaders.

Ever-shrinking staffs and budgets were trying to keep pace with ever-growing environmental standards and regulations. The states decided to strengthen their relationship with the EPA to improve

environmental protection. After discussing common goals, the partners chose water quality standards and the submittal, review and approval process as their first project.

All involved agreed the process had become frustrating and time consuming. By changing it, the states and EPA could save both time and money, allowing more timely improvements to water quality in all four states. The partners chose the "Kaizen" method for process improvement. Kaizen, a Japanese word meaning "change for the human good," is a work-

place improvement strategy used by the Toyota Production System.

In June 2007, representatives from EPA Region 7, EPA's headquarters in Washington, D.C. and the four states met to map out the water quality standards development process. By the end of this meeting, participants had identified several steps that could be eliminated or compressed.

Missouri now benefits from a more efficient method of developing water quality standards so the new standards can quickly be implemented. This process also has been used to improve water pollution permit and financial assistance efforts.

The Department of Natural Resources put this same type of thinking into its recently released Permit Assistant program. This innovative Internet program is designed to improve customer service by making it easier to obtain permitting information. The program also earned the State of Missouri a Best State Innovation Award from ECOS. During its first year, the Permit Assistant site at www.dnr.mo.gov/mopermittassista has been visited 3,384 times.

A new community assistance portal also is now available on the department's Web site at www.dnr.mo.gov/assistance/. With just one click, this Web page consolidates links to the environmental information that Missourians most often need.

Prier's Pioneer Museum Expanded

A considerable amount of Missouri's traditional mineral wealth, American Indian history and pioneer artifacts have settled into Winfred Prier's Golden Missouri Pioneer Museum in Golden. Golden is about six miles north of the Arkansas border and 45 miles west of Branson.



In 1993, Prier acquired the collection of the Arlis Cogar family, who ran the Trail of Tears Museum in Huntsville, Ark. This combination brought over 10,000 Osage and other American Indian hunting tools, pottery and implements to share space with one of the Midwest's largest collections of carnival glass and other collector-glass types, Civil War memorabilia and pioneer artifacts and tools. Prier's museum, open free of charge from

April 1 to Oct. 31, isn't limited to a small array of rocks, minerals and artifacts. On display are a single 1,250 pound quartz crystal, a two-ton quartz crystal cluster, a 7-foot-tall petrified tree, estimated at 250 million years old, and a turquoise carving made from a single 68-pound nugget. Prier has expanded the display area this year.

To find the Pioneer Museum, take Highway 65 south of Branson to Highway 86 west, then north on Highway J

and right on National Forest Road 2278 to Golden.

For more information on the museum, check [www.goldenmissouri.com/], or call (417) 271-3299.

New Madrid Seismic Zone Conference Set

The Department of Natural Resources is co-hosting an earthquake preparedness workshop Aug. 12-14 on the campus of the Missouri University of Science and Technology in Rolla. The conference will focus on the New Madrid Seismic Zone, a seismically active area in southeast Missouri.

The conference will bring together academia, government, non-government agencies and the private sector to address the needs of the response and recovery community. Specific topics will include the consequences of a major earthquake, geological and structural monitoring, geologic mapping activities, engineering effects and stresses, socio-economic impacts and mitigation plans for infrastructure and transportation. Also, the State Emergency Management Agency will conduct training.

The department joins the U.S. Geological Survey Mid-Continent Geographic Science Center, SEMA and the Missouri University of Science and Technology as hosts. For details, visit the department's Division of Geology and Land Survey Web site: [www.dnr.mo.gov/geology/].



Web Site Advice On Saving Gas

As fuel prices started to rise again, the department's Energy Center renewed its "Saving Green on Gasoline" campaign, offering tips and information to help Missourians save on fuel costs. A Web page and brochure are available featuring the latest in fuel economy tips and Internet links to resources on driving techniques, vehicle maintenance, trip planning, carpooling, mass transit and car buying. Visit the department's Web page at [www.dnr.mo.gov/energy/savinggreen].



environmental notes



More Than Ever ... Recycling Still Worth the Effort

In 1990, the state legislature passed a bill that challenged Missouri businesses and consumers to reduce the amount of material going to statewide landfills by at least 40 percent. Through a campaign of statewide education and creation of local programs to reduce, reuse or recycle trash, the diversion goal was reached, and exceeded. The combined efforts of state and local governments, solid waste districts, businesses and individuals

made "The Three Rs" an enduring phrase. Since 2001, each year has resulted in waste diversion of 40 percent or more from landfill disposal.

The trouble is, more waste is generated each year so waste diversion efforts remain important. In 2006, the waste diversion rate was 44 percent, down from the high point of 46 percent in 2005. Counting the unusual amount of storm debris that Missouri produced in 2006, the estimated amount of trash generated statewide increased from 12.1 million tons to 12.5 million tons.

In 2006-2007, the Missouri Department of Natural Resources and Midwest Assistance Program learned from a study of 15 statewide waste disposal facilities that nearly 45 percent of the trash processed at these sites could have been recycled. This amounted to 1.9 million tons of glass, metal, paper and plastics. If recycled, the study determined, the material would have been worth \$208 million dollars. Instead, it was buried in landfills.

Presently, people seem to pay closer attention to the economy and global warming, so the researchers considered how much energy would have been saved if this 1.9 million tons of material had been recycled. Since it takes less energy to produce products from recyclable material than virgin raw materials, recycling would have saved 28 billion Btu of energy – enough to meet the annual energy needs of 262,000 homes. Based on the average cost of propane in 2006 and 2007, the energy savings would have been worth \$500 million.

If you would like to reduce the amount of waste you generate, here are some steps to follow:

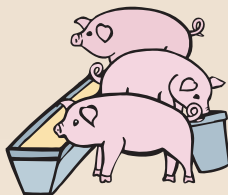
- ⊗ Avoid purchasing over-packaged products.
- ⊗ Buy concentrated products.
- ⊗ Reuse cardboard boxes, plastic bags and paper sacks.
- ⊗ Invest in durable, quality products rather than disposable ones.
- ⊗ Remove your name from the mailing lists of unwanted materials.
- ⊗ Avoid online or catalog purchases that can be bought locally.
- ⊗ Choose reusable containers over throwaways.
- ⊗ Share magazines and other reading material.
- ⊗ Donate usable goods, such as clothing and appliances, to charity.

The department has several fact sheets and brochures on the Web that can provide additional ways to reduce waste. For additional ways to reduce waste in your business or home, visit [www.dnr.mo.gov/env/swmp/pubs-reports/publist.htm] or contact the Solid Waste Management Program at 1-800-361-4827 or (573) 751-5401.

More Stringent Regs for CAFOs

The Missouri Department of Natural Resources and Clean Water Commission are working on regulation changes that are needed to avoid U.S. Environmental Protection Agency objections to permits issued to concentrated animal feeding operations. If the department doesn't move forward on these changes, its ability to issue these permits will be jeopardized as early as February 2009.

The EPA's 2003 CAFO final rule is more stringent than current Missouri



regulations. The department had been unable to move forward with its rule-making because of legal challenges. The updated federal rules place more emphasis on proper management of animal manure. This would modify requirements for best management practices, land applications and nutrient management.

The changes also include lowering the animal threshold number for swine weighing less than 55 pounds for Class 1C operations from 15,000 to 10,000 swine and expanding the inspection, record keeping and annual reporting requirements to include all of the current federal requirements.

If the commission agrees, the department will file a draft amendment

with the secretary of state to initiate the formal rule process and accept comments on the draft rule from June 16 through Sept. 17.

The department has established a CAFO workgroup consisting of a variety of interested parties, including environmental organizations. The department met with the stakeholders and reviewed the draft amendment presented to the Clean Water Commission. For information on the CAFO rule changes, visit our Web site at [www.dnr.mo.gov/env/wpp/cafo-workgroup.htm]. For more information about CAFOs or water quality, visit [www.dnr.mo.gov/env/wpp/index.html] or call (573) 751-1300 or 1-800-361-4827.

Letters intended for publication should be addressed to "Letters," *Missouri Resources*, P.O. Box 176, Jefferson City, MO 65102-0176 or faxed to (573) 522-6262, attention: "Letters." Please include your name, address and daytime phone number. Space may require us to edit your letter. You also can e-mail *Missouri Resources* staff at moresdnr@dnr.mo.gov



I particularly enjoyed your last-issue coverage of the Missouri River floating. Growing up in St. Louis County, we were always warned by parents about how dangerous the river was with its undertows that would suck you under in an instant. This was probably an attempt to keep us from swimming in the main river, which it did, but didn't prevent our swimming in the sandy low-water holes in the summer.

I would like to see an analysis by DNR of the effect on the water table and state aquifers of the increased water usage brought about by the ethanol plants. I understand that they use a lot of water and that your test wells can measure this usage. This analysis may not be conclusive at this time due to the infancy of the industry, but perhaps some trends can be arrived at now.

Thanks for a fine magazine and for the work you do informing the public on the status of our natural resources.

Lyle Hill
Rhineland

Editor's Note:

This is a shortened version of the written response to Mr. Hill from Jim Vandike, R.G., groundwater section chief at the department's Division of Geology and Land Survey.

As of October 11, 2007, there were only 5 operating ethanol plants in Missouri, one of which uses surface water. Three use water from the Missouri River alluvial aquifer. This aquifer can supply an ethanol plant with little impact to aquifer water levels. One plant uses groundwater from the deep Cambrian-Ordovician aquifer. No observation wells are close to this facility

but the aquifer has a good yield and there have been no reports of problems with nearby wells. To date, operating ethanol plants have not had a major impact on groundwater resources.

We enjoy *Missouri Resources* and the article on the "Recreational Trails Program" raised the question regarding the 30 percent of parks' funding that is earmarked for ATV trails, etc. My wife and I both enjoy ATV trail riding, but don't enjoy the 150 to 200 miles of travel needed to get to a legal area (Finger Lakes or Chadwick). Are there plans for such a park in our northwest part of the state?

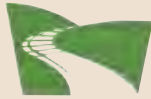
Cleve and Sara Hargis
Camden Point

Editor's Note:

The ATV portion of funding through the Recreational Trails Program is used mainly to maintain and expand existing ATV trails, which are located in five areas of the state. ATV trails cannot be located in all areas because of the impact they have on natural resources. The department administers ATV trails in Finger Lakes and St. Joe state parks but does not have any land suitable in northern Missouri for developing ATV trails. Two other agencies in the state have areas allowing ATV usage, including the area referred to in Chadwick and the Sutton Bluff area, owned by the U.S. Forest Service. The U.S. Army Corps of Engineers has Copper Creek, a property near Truman Lake. Conservation Areas are administered by the Missouri Department of Conservation.

Katy Trail Receives National Recognition

Katy Trail State Park has received another national recognition – induction into the new Rail-Trail Hall of Fame.



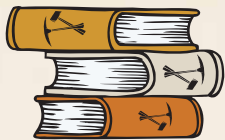
rails-to-trails
conservancy

The Rail-Trail Hall of Fame was created by the national Rails-to-Trails Conservancy with a goal of inducting five exemplary rail-trails each year. Katy Trail was chosen as the second rail-trail to be included.

The Katy Trail is the longest developed rail-to-trail conversion project in the nation. It also has been recognized nationally for the outstanding recreational opportunity it provides and the significant economic boost it has given the many communities along its route.

The trail currently runs 225 miles from Clinton to St. Charles with work continuing on extending it from St. Charles to Machens. Because of the settlement agreement between the Department of Natural Resources and AmerenUE concerning the Taum Sauk reservoir breach, plans also are underway to connect the Katy Trail from Windsor to Pleasant Hill alongside the former Rock Island Railroad. This will make the state park a cross-state trail from the St. Louis area to the Kansas City area.

Book Explores Missouri Geology



What is a shut-in? Were the granite boulders at Elephant Rocks State

Park brought by a glacier? Why is Natural Bridge Road in St. Louis so named? These and other questions about many of Missouri's natural wonders are answered in *Geologic Wonders and Curiosities of Missouri*. Published by the Department of Natural Resources' Division of Geology and Land Survey, a limited supply of this book is available. Another entertaining and educational title is *Springs of*



Stream Team Notebook

United For Water Quality

Eleven years ago, a single event brought together Douglas County's Stream Team 697.

In 1997, neighbors heard rumors that the North Fork of the White River was polluted. They called the department's Southwest Regional Office and asked for an investigation. The regional office performed chemical testing only to find that water quality in the stream was high. After that, a team of volunteers organized to monitor the stream to ensure that water quality remained high in the future. The volunteers sought training and equipment through the Stream Team Program to conduct their own biological and chemical monitoring.



Photo by Susan Higgins

Elitta January, Janet Chapin and Joyce Kennedy prepare to measure the width of the North Fork. Measuring the stream width is an important step in determining the volume of water flow, which is used to understand the impact of chemicals found in the stream.

Stream Team 697, led by Elitta January and Janet Chapin, consists of 15 volunteers who monitor at the head of navigational water in the North Fork of the White River. The team conducts macroinvertebrate monitoring at least four times each year. The team also is involved with bird watching, viewing eagles, hawks, owls and other wildlife on the river.

According to January, members of the team have seen many changes in the watershed over the past 35 years. In recent years, the watershed has received less precipitation and has been impacted by more logging on the upland slopes. In the future, the team would like to do a tree planting project, similar to one they witnessed in a neighboring watershed.

The Stream Team Program is a cooperative effort between the Missouri Department of Natural Resources, the Missouri Department of Conservation and the Conservation Federation of Missouri. To learn about the Stream Team Program, visit [www.dnr.mo.gov/env/wpp/VWQM.htm] or [www.mostreamteam.org].



Missouri. Missouri is blessed with an abundance of springs that have played a major role in the settlement and development of the state. The Missouri Ozarks comprises one of the nation's greatest concentrations of springs. This book provides information on what makes springs work, pol-

lution potential, historical use of springs and flora and fauna found in and around them. These and other publications may be ordered online at [www.dnr.mo.gov/geology/adm/publications/] or visit the maps and publications desk at 111 Fairgrounds Road in Rolla.

TIME EXPOSURES



Paper recycling for a patriotic purpose was underway in January 1942 at the American Legion paper collection booth in Chillicothe. The photo was taken by John Vachon for the Farm Security Administration.

Vachon went to Washington D.C. after graduating from college in St. Paul, Minn. in 1934. He then filed photos until 1938 when Roy Stryker of the FSA encouraged him to join a small group of photographers who became famous documenting conditions in rural America during the Great Depression. He joined the U.S. Army in 1945. Between 1947 and 1949 he was a staff photographer for LIFE magazine. Then, for 25 years he worked for LOOK magazine. When LOOK closed in 1971 he became a freelance photographer. He died in 1975 in New York at age 60.

Scrap paper collections were eventually determined to have done more for local civic pride than provide tangible support for the war effort.

Vachon, John. Black-and-white photographs from the FSA-OWI, 1935-1945. American Memory, Library of Congress.

Send your photo to "Time Exposures," c/o Missouri Resources, P.O. Box 176, Jefferson City, MO 65102-0176. All pictures will be returned via insured mail. Pre-1970 environmental and natural resource photos from Missouri will be considered. Please try to include the date and location of the picture, a brief description and any related historic details that might be of interest to our readers.

Grant Program Targets Heritage Properties

A new grant program has provided a half-million dollars to 12 communities to help preserve Missouri's publicly owned buildings. The first round of the Missouri Heritage Prop-



erties Program targeted county-owned properties, such as historic county courthouses. Properties receiving grants are listed or eligible for listing in the National Register of Historic Places.

Eight of the grants are for construction activities and four are for feasibility and planning activities. Construction grants were awarded to Saline,

Livingston, Nodaway, Pettis, Dunklin and Pemiscot counties. Caruthersville and Cape Girardeau also were given grants. Planning and feasibility grants were awarded to Adair, Ralls, Hickory and Bates counties.

The new program complements Gov. Blunt's DREAM (Downtown Revitalization and Economic Assistance for Missouri) Initiative, which helps create new growth and economic development in Missouri communities. The department's State Historic Preservation Program administers the Heritage Properties Program, which is funded by the state's non-resident athletes and entertainers tax.

Missouri River Relief Cleaning Up Again

Missouri River Relief, Columbia, is in its eighth season working with local volunteers to clean up



the Missouri River. Individuals or groups can sign up for remaining events on their Web site, [www.riverrelief.org], where more details and directions to the cleanups can be found.

On July 15-19, River Relief will provide safety boats for the Missouri River 340, the world's longest continuous river race.

Sept. 12-13 is the Missouri River Learning Festival and Confluence River Cleanup at Columbia Bottoms Conservation Area in St. Louis. Oct. 3-4 will be the Missouri River Watershed Festival and Missouri River Cleanup at La Benite Park, near Kansas City.

Check the Web site for updates or call (573) 443-0292.

For news releases on the Web, visit [www.dnr.mo.gov/newsrel/index.html]. For a complete listing of the department's upcoming meetings, hearings and events, visit the department's online calendar at [www.dnr.mo.gov/calendar/search.do].

Teaching the Three R's Parkway Schools

In 1990, a presentation made by three fifth-grade students to the Parkway Board of Education about the importance of materials recovery sparked a materials recovery / recycling program that quickly grew. Reduce, reuse, recycle.

The Parkway district, headquartered in Chesterfield, initiated a program that now includes recovery of ink jet cartridges, used cooking oil, e-scrap, fluorescent lamps, ballasts, paint thinner, lead acid batteries, mercury and science classroom chemicals and all traditional recyclables. Parkway also has materials recovery partnerships with a church, a mortgage company and the St. Louis Butterfly House. The district accepts recoverable materials from these partners and sells these commodities on the market.

Rather than throwing away old textbooks that are no longer in use, the district recovers these books and sells them at a book sale. Parkway's grounds department has partnered with local tree services to help the district gather yard waste and convert it into chips and mulch.

Staff use a Material Safety Data Sheet program for each of the district's buildings that enables them to maintain an up-to-date inventory of hazardous materials within the buildings. The district also is reducing mercury-containing equipment from the schools, such as thermometers and blood pressure cuffs from the nurse's office and thermometers, psychrometers and barometers from the science labs.

Parkway's environmental services department has set the bar in environmental management, earning both state and national accolades. The EPA, Choosing Environmental Excellence, the National Recycling Coalition, the Missouri Waste Control Coalition and the Solid Waste Association of North America have all honored the district for its materials recovery program.

Because of Parkway's commitment to energy efficiency, which ranges from educating employees to mechanical upgrades, the district was invited to serve as a pilot in an effort to install solar panels at several St. Louis-area schools. Parkway received a \$20,000 grant funded by AmerenUE and administered by the Missouri Department of Natural Resources to install a one-kilowatt photovoltaic demonstration system. The grant also helps fund several educational tools for students and the community.

"I have calls from parents and other community members asking not only about our environmental programs, but also about problems that they have in their own home and how can they solve those problems," said Juliette Travous, manager of environmental services for the district. "As our employees become more environmentally aware in their work here in the district, that awareness will spill over into their daily life at home and will promote more environmental efforts in our area."

If all this isn't impressive enough, consider this: In just seven years, Parkway has recovered and recycled 20,445,695 pounds of materials and generated \$212,285 in revenue. Since its inception, the energy program has saved the district an estimated \$12,395,534 and the environmental savings from the energy program are equivalent to removing an estimated 44,631 cars from the road. To think, all this started with three fifth-graders and one big idea.



Parkway School District photo

Ericka Reed, a Craig Elementary School employee, encourages young recyclers.

Peerless Performance Greg Combs

Greg Combs, Eastern Parks District supervisor for the department's Division of State Parks, was named the Missouri Department of Natural Resources' October 2006 Employee of the Month and the November 2006 State Employee of the Month.

Combs was nominated by his peers for his outstanding efforts following the Dec. 14, 2005, breach of the AmerenUE Taum Sauk Reservoir that flooded Johnson's Shut-Ins State Park. His outstanding commitment, leadership and patient professionalism during the crisis earned him both honors.

Combs was in contact with emergency workers soon after the 5:30 a.m. disaster and worked seven days a week for many months as on-scene coordinator as well as maintaining his role as district supervisor. He spent countless hours at the damaged park, at public meetings, planning sessions, responding to media and legislative contacts, and attending related events.

"Greg possesses outstanding communication skills and has demonstrated an ability to communicate effectively with individuals at all organizational levels," said Randy Clay, facility manager at Sam A. Baker State Park. Combs coordinated recovery activities with the department's environmental emergency response team, AmerenUE staff, MACTEC, the utility's on-site coordination team, and several state and federal agencies.

"In my position, I find that my effectiveness is measured by my ability to communicate the direction or means to address or remedy a situation," he said. "Having a solid working relationship with my staff is the foundation of my management style."

"From my observations working with Greg as his assistant, he has navigated the complex web of the event itself along with negotiating with professionals from other agencies," said Kevin Albrecht, field operations coordinator for the Eastern Parks District. "One cannot overlook the impact this event also placed on his family, being away from home for extended periods."

Joseph P. Blum, superintendent at St. Francois State Park said, "Having spent some time on assignment at the shut-ins the winter and spring following the event, I can personally attest to the deep level of commitment Greg has exhibited. Since the very moment of the breach of the Taum Sauk Reservoir, Greg has been on hand and deeply involved in the long and complicated process of securing the area and bringing the park back to life."

"All of those who have visited and enjoyed Missouri's state parks and historic sites should be thankful that their park system is served by such a tireless professional as Greg Combs," said Blum.

Today, Combs continues to place the recovery of Johnson's Shut-Ins State Park a high priority in his job.

Combs, his wife Michelle, and sons Derek and Jackson, live near Festus. He has been with the department for 11 years.



DNR photo by David Kelly

Greg Combs

Boy Gone Wild!

(on the Katy Trail)

by J. D. Balkenbush
photographs by Scott Myers

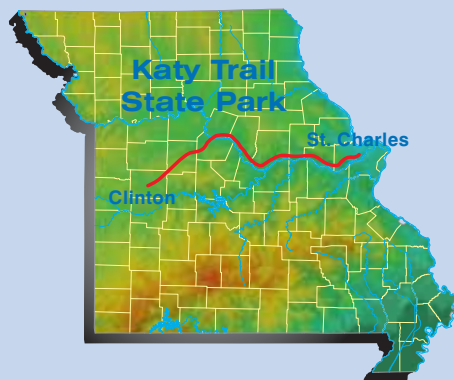


(Above) Equipment repairs on a long Katy Trail ride can be as simple as a fixing a broken cleat on a biking shoe.

(Above right) Cruising the Missouri River from a bicycle seat is possible along much of the Katy Trail.



Every June, 300 bicyclists gather together with one common goal – to ride Katy Trail State Park between St. Charles and Clinton in five days. Since 2001, the Missouri Department of Natural Resources has sponsored a ride on the Katy Trail, providing support, shuttle service and meals for registered participants. Many riders have made the ride an annual tradition and it attracts participants from all experience levels and age groups. A beginner on the ride was then 14-year-old J.D. Balkenbush, an avid mountain biker but somewhat new to long-distance bicycling. What follows is his account of the 2007 “Wild on the Katy” trail ride.



Hmmm, what to do? I would graduate the eighth grade in May. And then it would be summer, and I would be looking for fun and exciting things to do. I needed to start planning now or I could end up hanging out with my 11-year-old sister and doing odd jobs around the house all summer. B-O-R-I-N-G!

What I needed was a challenging adventure, something that was fun-filled, would offer a real sense of accomplishment, yet wasn't too expensive. Hey, wait a minute! I recalled

my dad saying something about the annual bike ride on the Katy Trail.

I'd been on the trail lots of times, but could I keep up with the group and travel more than 200 miles in just a week's time? This could be the challenge I'd been looking for. I had the bike and gear – now I just needed the green light from my folks. I talked to my dad, and together we persuaded my mom to let me go.

I arrived at the first check-in at Clinton about 4 p.m. on Sunday, June 17. I signed in at registration where they gave me my official number. I would be known as "123" for the rest of the week. I also met Dawn Fredrickson, my adult guardian throughout the trip. She was a fun person to hang out with. I'm glad that since my dad couldn't ride the whole way, I still got to go, thanks to Dawn!

After dinner in Clinton, it was time for the first nightly rider's meeting. Each night, the riders were called together to learn important information about the next day's ride and see presentations about communities along the trail. After the rider's meeting, I decided to get some rest. Tomorrow might be a pretty long first day.

The next morning I woke up at 4 a.m. to the clatter of trucks unloading bikes and loading gear. I quickly stowed my gear and took down my tent. Dawn and I headed for breakfast and were among the first in line for biscuits and gravy. It smelled wonderful, but Dawn, having done

this ride the year before, cautioned me against filling up on a heavy breakfast before heading down the trail.

We were on the trail by 6:45 a.m. It was a beautiful morning, the sun just peeking through the trees as we started our 39-mile trip. Monday was a short day, which was a good thing as it gave everyone a chance to ease into the pedaling. We were riding along with lots of other people that none of us knew, but they were all friendly and by the time we made our first day's destination I'd made several new friends that I would ride with, eat with, endure pain

(Below) Comfortable shade plus local information for bicyclists is provided at shelters along the Katy Trail.

(Bottom) Katy Trail travelers often create a colorful tent city, complete with hot showers and lively entertainment.





(Top) Meeting bicyclists along the Katy Trail is one reason people enjoy the annual tour. Trailside activities are another draw for participants.

(Above) Support and gear (SAG) stops provide cold drinks, a variety of snacks and a much-needed break.

with, and laugh with throughout the week to come.

When we reached Sedalia at 11:30 a.m., I was starving. Luckily there is a wonderful restaurant inside an old MKT passenger car that serves some of the best barbecue sandwiches. After lunch I took a shower in the shower truck. That was an experience I'll never forget! There was a huge semi truck with men's and women's shower stalls on either side. They

were very small. Make a fist with both hands, put your knuckles together in the center of your chest, and then imagine that your elbows are touching the sides of the shower stall. But there was plenty of hot water and by the time I came out the other end of the truck, I was a new man.

Tuesday was the longest day. The SAG (support and gear) stops were nice and not too far apart, so it was not too bad. The only thing that got me was the dust everywhere. It was grinding in my chain and filling my socks. It was in my eyelashes and I could taste it on my tongue. I rode through two counties and eight towns that day without even noticing. I was tired but I did not SAG out that day. SAGing out is when you're unable to complete the day's ride and are bused into camp.

I reached base camp in Columbia at around 4:30 p.m. My dad met me for dinner in Columbia that evening. We ate a wonderful meal at the Flat Branch Restaurant where they brew their own beers. I had root beer, of course.

Wednesday came so fast that I don't even remember sleeping Tuesday night. When I woke up, I could hear the pancake truck and the rest of Pancake Man's devices in motion. He had arrived and was busily making untold amounts of French toast as far as the eye could see.

The trail was washed out in some places and there continued to be a lot of white dust. I learned that a can of WD-40 is essential to good bicycle maintenance in these conditions. My dad rode along that day and, to his surprise even though it was his first day and I was on my third, I still beat him to camp at Mokane. He laughed when I told him, "Pain is the path to joy!" The facilities were wonderful and the hospitality even better. I had a great dinner of pork steaks.

By Thursday, I was beginning to feel the effects of several days' pedaling. I was zapped, but I almost made it. If only the ride had been about seven miles shorter. I decided that I had had enough. Dawn and I SAGed out the last few miles before Augusta. It was disappointing not to make it the entire way, but I was glad to be done.

Friday, however, was a completely different story. It was the last day! I knew it was a short ride, and I was eager to complete the trip. Dawn and I started seven miles back from the rest of the pack to make up for our SAG-out the day before. We beat the sweepers to the first SAG point and that was a real confidence builder. The sweepers ride in back to make sure no one gets left behind.

It seemed as if the St. Charles City limit sign was the best sight of the whole trip! When I got into St. Charles I was happy to see my mom and sister, and most of all COLD Gatorade and lunch. It was a wonderful trip. I learned a lot about the environment, the history of the small towns along the trail, bicycles, pacing, friends and relationships, teamwork, and most of all, I learned a lot about myself.

The 2008 Katy Ride is scheduled for June 16-20. For more information or to register for the ride, visit the Web at [www.mostateparks.com/katytrail/2008ride.htm], or contact the department toll free at 1-800-334-6946 (voice) or 1-800-379-2419 (Telecommunications Device for the Deaf).

J. D. Balkenbush will be a high school sophomore this fall. He lives in the Jefferson City area with his family.



Darrell Pratte

No Boundaries

by Hylan Beydler

Mount Rushmore – a monument to three surveyors and one other guy. A broad grin creases Darrell Pratte's face as he responds, "You bet! Washington, Jefferson and Lincoln were all surveyors. The other guy is President [Theodore] Roosevelt."

"The three surveyors would likely be pleased to know that Missouri depends on original surveys completed when they, themselves, were alive," said Pratte, a professional land surveyor with the Department of Natural Resources. Pratte is geodetic survey section chief with the Division of Geology and Land Survey in Rolla.

Missouri surveys conducted between 1815 and 1855, using the cadastral system developed by Thomas Jefferson, are part of what is called the Public Land Survey System. These surveys created one-mile-square sections and remain the basis for all real property in the state. They are a consistent and accurate source of information for resolving property boundary disputes and related questions.

Pratte says "surveyors are like detectives with a spirit of adventure." He adds that surveyors are charged with protecting and maintaining Missouri's survey corners, and are bound to follow in the footsteps of previous surveyors. Researching maps, records, boundaries and other historical documents spanning centuries is an everyday occurrence.



DNR photo by Scott Myers

Pratte liked math in school, but was surprised to learn that mathematics could lead to a rewarding career outdoors. Talking to the father of a friend who happened to be a land surveyor, Pratte found he could work outdoors and still get a chance to use his considerable math skills.

"A career as a land surveyor offers a good mix of indoor and outside work," Pratte said. "It is especially nice being outdoors on sunny days and remaining inside on the cold, blustery days. Those days are made for paperwork."

Pratte employs global positioning system satellites, sophisticated data collectors, refined observation techniques and advanced computer software.

"Taking precise measurements on the earth's surface is one of our areas of expert-

Surveyor Darrell Pratte studies a historical map as he begins the process of defining Missouri section corners and property boundaries.



State surveyor Pratte uses satellite-based technology and a computerized data collection device to determine and record the exact location of original survey markers and compare them with modern property boundaries. To maintain accuracy, old markers of stone or timber are replaced with aluminum monuments.

ise,” he said. “The geodetic markers we place in the ground ... are integral to our state’s infrastructure.”

Known as the Missouri Geographic Reference System (GRS), this network of markers is the foundation of map making and the basis for locating large construction projects where horizontal and vertical survey positioning is critical.

A typical day for a field crew, or survey party, involves traveling to the site to gather data. Corners set by previous surveyors are located and the project is tied in to the Missouri GRS. Stored on a handheld collector, the data are taken to the office where technicians download the information for processing. The surveyor will calculate positions for missing property corners to determine whether enough information was collected.

“While there seems to be high reliance on computers, knowledge of mathematical theory is essential,” said Pratte, who has worked in all areas of surveying.

Pratte studied surveying and mathematics at Three Rivers Community College in Poplar Bluff and the University of Missouri-Rolla. He began his career with a surveying company in Poplar Bluff. Next year, Pratte will have been with the department for 23 years and will serve as president of the Missouri Society of Professional Surveyors. He also is a member of the National Society of Professional Surveyors and the Missouri Association of County Surveyors.

A college degree is not required to become a professional land surveyor in Missouri. Universities and community colleges offer classes to satisfy the educational requirement of 12 semester hours to become a land surveyor-in-training. Experience and state exams qualify a land surveyor for professional status.

According to Pratte, anyone who likes being outdoors, is somewhat technical, and has good communication skills may enjoy a career in surveying. Surveying also is attractive to people with forestry, history, engineering, botany, geology, hydrology, anthropology, computer science and astronomy backgrounds.

Pratte recently assisted a concerned citizen who called the office inquiring about several tripods and other instruments set up near their home. Pratte explained that the county surveyor and the department had entered into an agreement to remonument an original survey marker in that area. The department contracts annually with county commissions and their surveyors to replace about 400 survey corners. Pratte suggested the marker near the caller might originally have been a pile of rocks, a stone or possibly an old pipe. He assured the caller that the position of the corner would not change and explained that a new aluminum monument would be reset in the exact spot. Pratte enjoys answering questions and is often approached by citizens with questions while working in the field. An admitted history buff, Pratte said, “I love sharing all aspects of surveying.”

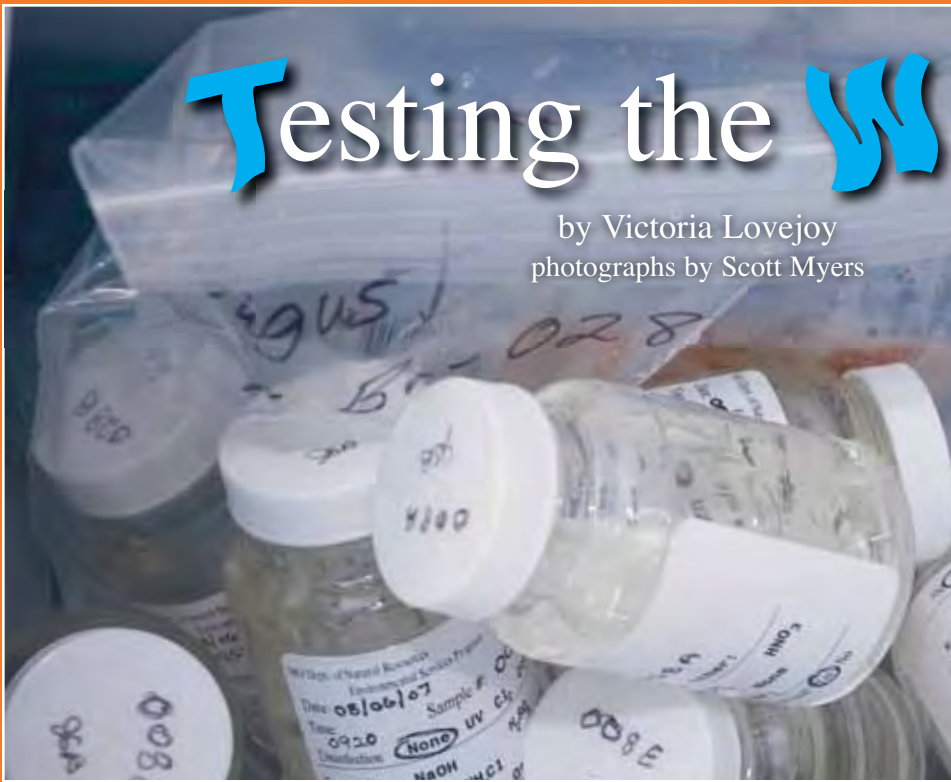
For more information about career opportunities at the Missouri Department of Natural Resources, call the department at 1-800-361-4827 and ask for the Human Resources Program.

Hylan Beydler is the information officer for the department’s Division of Geology and Land Survey.

Testing the Waters

by Victoria Lovejoy
photographs by Scott Myers

John Stanford, Joyce Butts and Marvin Mondy take water samples from the McCoy Branch Cove at the Lake of the Ozarks in August 2007.



Anyone standing along the shores between Bagnell Dam and Community Bridge at the Lake of the Ozarks may have wondered what the fuss was about on a Tuesday morning last May. Nine teams of state water specialists and biologists, corporate officials and trained volunteers were grabbing water samples and talking on cell phones. They then hooked up with couriers who rushed the samples to an Osage Beach field laboratory in order to beat a six-hour deadline.

May 29, 2007, marked the beginning of a five-year water sampling study funded by AmerenUE. The program's success depends on teamwork among the Missouri Department of Natural Resources, Missouri Department of Conservation, AmerenUE and Lake of the Ozarks Watershed Alliance (LOWA).

The program is specifically checking the water samples for *E. coli*, a common type of bacteria that normally lives in the intestines of warm-blooded mammals. Only eight of the 356 samples collected during 2007 exceeded the standard for the *E. coli* bacteria.

Greg Stoner, Conservation fisheries biologist, coordinated the sampling while Scott Robinett, Natural Resources water specialist, tested the water samples at the laboratory.

"The results of the first season indicate that water quality in the area that we monitored this year is generally in good condition with respect to whole body contact recreation," said Robinett. "The higher *E. coli* counts that we encountered were isolated."

The use of LOWA volunteers, who were trained in proper sampling techniques, nearly quadrupled the number of locations tested, according to Robinett.

"With the allotted funding, number of staff, and only one boat, we were previously looking at only about 30 sample points per month," he said. "With LOWA's assistance, we are sampling 119 points in 28 coves from Bagnell Dam to the Community Bridge this season."

Marvin Mondy, LOWA vice president, was impressed with the teams' close attention to protocols.

"We hope that the results will offer insight to the current bacteria load of the lake waters," said Mondy. "Then we

can begin to build a database to examine long-term conditions of the lake as far as bacteria counts are concerned."

AmerenUE employees Brian Vance and Jeff Green, both of the company's Shoreline Management Program, plan to continue their participation in the study.

"We are very supportive of the sampling effort and look forward to the data that is collected," Vance said.

Water sample test result data are available online at [www.lmv.org/LOWA/ecoli.htm]. A link to the data can also be accessed through LOWA's Web site, [www.soslowa.org].

Victoria Lovejoy is a public information specialist with the department's Southwest Regional Office in Springfield.



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